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GB 2229668 A EP 0525268 A1

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## (54) Door check mechanism

(57) A door check mechanism 10 including a door check arm 11 longitudinally movable through a check housing 12. The check arm 11 having opposite cam faces and the check housing 12 including a pair of reaction members 15 biased toward one another, the check arm passing between the pair of reaction members 15 so that a respective reaction member 15 is in contact with a respective cam face of the check arm. The check arm comprises an elongate body 18 moulded from a plastics material so as to define said opposite cam faces. At least one of said cam faces having moulded therein a laterally projecting shoulder 29 for co-operation with a respective reaction member 15 for defining a check position. The plastic body 18 encapsulating an elongate tensile member 60 having a connection formation 50 at one end for attachment to a mount. The tensile member may be formed from a steel strip with a series of openings 62, so that the plastics material passes through the openings 62.

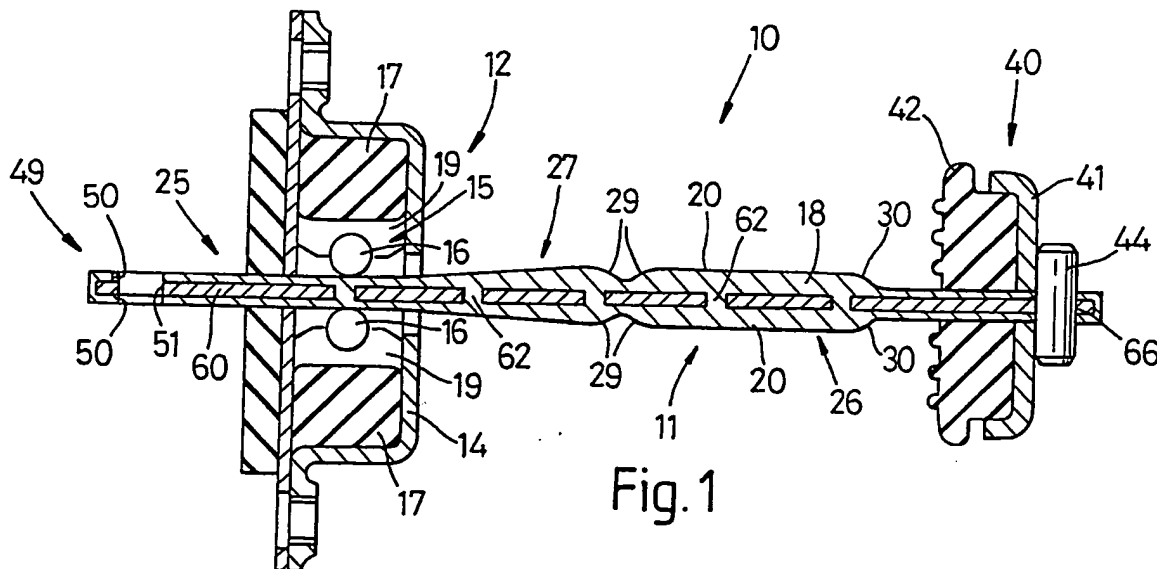
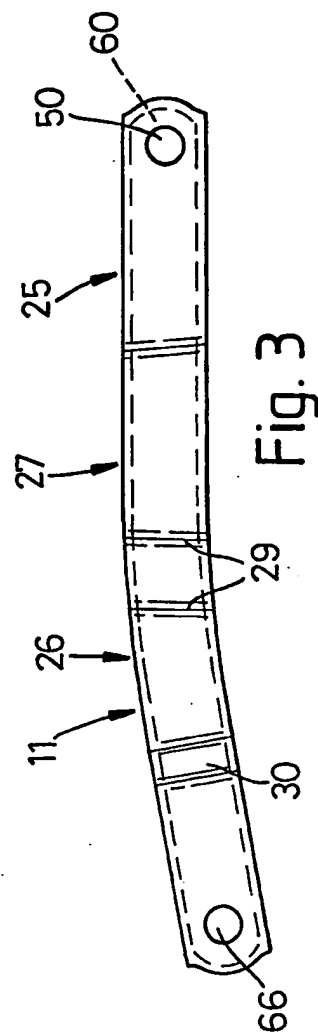
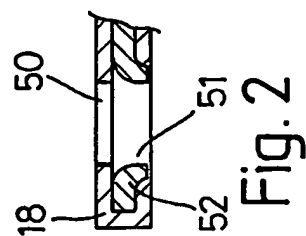
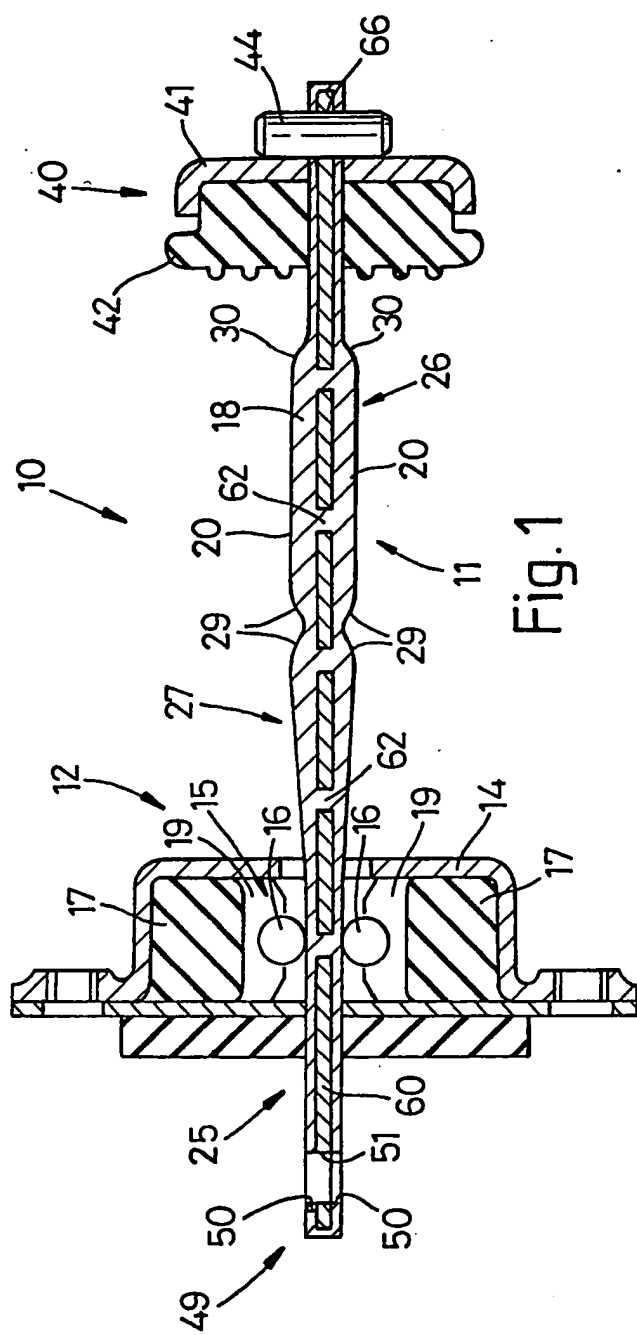


Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

The print reflects an assignment of the application under the provisions of Section 30 of the Patents Act 1977.



The present invention relates to a door check mechanism, particularly a door check mechanism for a vehicle door.

Vehicle door check mechanisms are known and they  
5 normally comprise a check arm which is pivotally attached at one end to the door frame and passes through a check housing mounted on the door such that opening and closing of the door causes the check arm to move longitudinally through the check housing.

10 The check housing usually includes a pair of opposed reaction members defining cam followers, usually in the form of rollers, which are biased toward one another. The check arm is fed between the reaction members and includes cam faces formed on opposed sides of the arm along which  
15 respective reaction members ride. Normally each cam face includes laterally projecting shoulders which define a check position.

The arm is usually formed from a steel strip which is shaped by stamping techniques to provide the cam faces.  
20 The arm may be a single strip or a pair of superimposed strips. Forming of the arm from steel strip in this manner is undesirable for mass production since dimensional inaccuracies can arise in the thickness of the arm (ie. the distance between the side faces in contact with the rollers  
25 of the check housing) and this is undesirable as it can materially affect the check loadings applied by the check mechanism to the door. Typically, the variation in thickness can be  $\pm 0.5$  mm.

A further drawback is that the steel strip has to be protected against corrosion and this is normally achieved by the provision of a corrosive resistant coating. Unfortunately continual opening and closing of the door causes the rollers to gradually wear the coating away and thereby expose the strip to potential corrosion. Accordingly, the protective corrosive resistant coating has to be wear resistant and carefully applied. This adds to the production cost.

10 A general aim of the present invention is to provide a door check mechanism which avoids or reduces the above drawbacks.

According to one aspect of the present invention there is provided a door check mechanism including a door check arm longitudinally movable through a check housing, the check arm having opposite cam faces and the check housing including a pair of reaction members biased toward one another, the check arm passing between the pair of reaction members so that a respective reaction member is in contact with a respective cam face of the check arm, the check arm having an elongate body moulded from a plastics material so as to define said opposite cam faces, at least one of said cam faces having moulded therein a laterally projecting shoulder for co-operation with a respective reaction member for defining a check position, the body encapsulating an elongate tensile member having a connection formation at one end for attachment to a mount.

Preferably the tensile member is defined by a metal

strip. The metal strip is preferably provided with openings which during moulding of the body permit a plastics connection to be made therethrough to resist delamination of the plastics body from the metal strip.

5 According to another aspect of the present invention there is provided a check arm for a door check mechanism, the check arm comprising an elongate plastics body encapsulating a tensile member extending longitudinally within the plastics body, the tensile member having at  
10 least one end a connection formation for connection to a mount. Preferably the other end of the tensile member is adapted for connection to a stop for arresting relative longitudinal movement of the check arm through the check housing.

15 Preferably the plastics body is moulded so as to define at least one cam face extending longitudinally along one side of the body for co-operation with a reaction member located in a check housing, said one cam face defining a cam track along which the reaction member rides  
20 on relative longitudinal displacement of the arm through the housing, the cam face including a laterally extending shoulder for forming a check position.

Various aspects of the present invention are hereinafter described with reference to the accompanying  
25 drawings, in which:-

Figure 1 is a longitudinal cross-section of a door check mechanism according to one embodiment of the present invention;

Figure 2 is a more detailed sectional view of an end portion of the check arm shown in Figure 1;

Figure 3 is a side view of the check arm only shown in Figure 1.

5        The door check mechanism 10 includes a check arm 11 and a check housing 12. The check housing 12 includes a casing 14 which is normally secured to a door (not shown). The casing houses a pair of opposed reaction members 15 in the form of rollers 16 housed in casings 19 which are  
10        biased toward one another by resilient blocks 17; the check arm 11 being located inbetween the rollers 16.

      The check arm 11 includes an elongate body 18 of plastics material which has opposite longitudinal sides 20 defining cam faces along which respective rollers 16 ride  
15        during longitudinal displacement of the arm.

      The body 18 includes a first longitudinal region 25 of minimum constant width, a second longitudinal region 26 of maximum constant width and a third longitudinal region 27 located between regions 25 and 26 which defines a ramp  
20        portion. The laterally extending shoulders 29 are formed in the plastics body inbetween the second and third regions 26,27 to define an intermediate check position for the door and a laterally extending shoulder 30 is formed at the terminal end of the second region to define a check  
25        position at the fully open position of the door.

      The end of the check arm 11 adjacent to the second region 26 is provided with a stop 40. The stop 40 is defined by a casing 41 mounted on the check arm, the casing

41 housing a resilient block 42. The casing 41 is restrained from axial movement off the check arm 11 by means of a pin 44 passing laterally through the arm 11.

The opposite end 49 of the arm 11 is provided with an aperture 50 to enable the check arm to be pivotally connected to a door surround (not shown).

The body 18 includes a tensile member 60 extending longitudinally within the body 18 and so is totally encapsulated thereby. The tensile member 60 extends to end 49 and includes an aperture 51 coaxial with the aperture 50 formed in the body 18.

Accordingly, in use, the tensile member 60 is directly connected to the door surround and so is able to accommodate tensile loadings applied to the arm 11 during relative longitudinal displacement of the arm through the check housing 12 as occurs when the door is opened and closed thereby causing the housing to run along the cam. This serves to isolate the body 18 from tensile loadings along the arm from its point of connection with the door surround.

The tensile member 60 is preferably formed with a series of openings 62 along its length and the body 18 is preferably moulded onto the tensile member 60. Thus during the moulding process, plastics material passes through the openings 62 to form a positive integral connection between portions of the body 18 on opposite sides of the tensile member and so reduces the likelihood of delamination.

Preferably the tensile member 60 extends to the opposite end of the arm 11 and is provided with an aperture 66 for receiving pin 44. Thus the body 18 is isolated from tensile loadings imparted on the arm 11 when the stop 41  
5 abuts against the housing 12 when the door is in its fully open position.

Preferably as seen in Figure 2, the apertures 51,66 are formed through flared portions 52 in member 60.

Preferably at least the aperture 51 has an internal  
10 frusto-conical shape so as to be capable of receiving a tapered pin. This enables a tight fit to be achieved between the pin and aperture 51 and so reduces the likelihood of rattle.

The tensile member 60 is preferably formed from a  
15 metal strip such as steel. Since the tensile member 60 is totally encapsulated it does not need to be treated against corrosion and does not have to be hardened by heat treatment.

The body 18 is preferably moulded from a suitable  
20 rigid plastics material such as a polyamide which preferably includes a filler such as glass.

Since the body 18 is moulded, the cam faces and positions of laterally projecting shoulders 29,30 can be accurately produced by mass production techniques. In  
25 particular, the thickness of the arm, ie the distance between opposite sides 20 can be accurately reproduced on a mass production scale, typically to a tolerance of  $\pm 0.05$  mm, and so provides consistent check loadings. In



addition, the longitudinal positions of shoulders 29,30 on opposite cam faces can be accurately reproduced to ensure that respective rollers 16 simultaneously co-operate with shoulders 29,30 on opposite sides of the arm and thereby  
5 provide a maximum check force.

In certain applications it is envisaged that a cam face may be formed on one side 20 of the body 18 only.

CLAIMS

1. A door check mechanism including a door check arm longitudinally movable through a check housing, the check arm having opposite cam faces  
5 and the check housing including a pair of reaction members biased toward one another, the check arm passing between the pair of reaction members so that a respective reaction member is in contact with a respective cam face of the check arm, the check arm having an elongate body moulded from a plastics material so as to define said opposite cam faces, at least one of said cam faces  
10 having moulded therein a laterally projecting shoulder for co-operation with a respective reaction member for defining a check position, the body encapsulating an elongate tensile member having a connection formation at one end for attachment to a mount.
- 15 2. A door check mechanism according to claim 1 wherein the tensile member is defined by a metal strip.
3. A door check mechanism according to claim 2 wherein the tensile member includes an aperture formed at said one end for connection to said  
20 mount, the aperture being formed in a flared portion of said tensile member.
4. A door check mechanism according to claim 2 or 3 wherein the metal strip is provided with openings and the body is integrally moulded thereon so that during moulding of the body the openings permit a plastics connection to  
25 be made therethrough to resist delamination of the plastics body from the metal strip.
5. A door check mechanism according to any preceding claim wherein the other end of the tensile member is adapted for connection to a stop for arresting  
30 relative longitudinal movement of the check arm through the check housing.

6. A door check mechanism according to any preceding claim wherein both cam faces have moulded therein a laterally projecting shoulder for co-operation with a respective reaction member for defining a check position

5 7. A door check mechanism substantially as described herein with reference to and as illustrated in the accompanying drawings.

8. A check arm for a door check mechanism, the check arm comprising an elongate plastics body encapsulating a tensile member extending longitudinally  
10 within the plastics body, the tensile member having at least one end a connection formation for connection to a mount.

9. A check arm for a door check mechanism substantially as described herein with reference to and as illustrated in the accompanying drawings.

15

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

GB 9206195.1

**Relevant Technical fields**

(i) UK CI (Edition L ) E2F (FSB, FSP)

(ii) Int CI (Edition 5 ) EO5C

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

**Search Examiner**

S J CHURCH

**Date of Search**

8 JUNE 1993

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2229668 A (AISIN), SEE PAGE 3, LAST LINE TO PAGE 4, LINE 21	1-3, 5, 6 & 8
E, X	EP 0525268 A1 (SOC.FINANCIERE ETUDE & DEV.IND WHOLE OF DOCUMENT	1-3, 5, 6 & 8

Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

**DERWENT-ACC-NO: 1993-330226**

**DERWENT-WEEK: 199623**

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**TITLE: Door check mechanism for vehicles - has arm movable through housing having opposite cam faces and pair of reaction members biased towards one another**

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**PATENT-ASSIGNEE: IHW LTD[IHWIN] , IHW ENG LTD[IHWEN]**

**PRIORITY-DATA: 1992GB-0006195 (March 21, 1992)**

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<b>GB 2266338 A</b>	<b>October 27, 1993</b>	<b>N/A</b>	<b>013</b>	<b>E05C 017/20</b>
<b>GB 2266338 B</b>	<b>May 15, 1996</b>	<b>N/A</b>	<b>001</b>	<b>E05C 017/20</b>

**APPLICATION-DATA:**

<b>PUB-NO</b>	<b>APPL-DESCRIPTOR</b>	<b>APPL-NO</b>	<b>APPL-DATE</b>
<b>GB 2266338A</b>	<b>N/A</b>	<b>1992GB-0006195</b>	<b>March 21, 1992</b>
<b>GB 2266338B</b>	<b>N/A</b>	<b>1992GB-0006195</b>	<b>March 21, 1992</b>

**INT-CL (IPC): E05C017/20**

**ABSTRACTED-PUB-NO: GB 2266338A**

**BASIC-ABSTRACT:**

A door check arm (11) is longitudinally movable through a check housing (12). The check arm (11) has opposite cam faces, and the check housing (12) includes a pair of reaction members (15) biased toward one another. The check arm passes between the pair of reaction members (15) so that a respective reaction member (15) is in contact with a respective cam face of the check arm. The check arm comprises an elongate body 18 moulded from a plastics material so as to define said opposite cam faces.

At least one of the cam faces has moulded a laterally projecting shoulder (29) for co-operation with a respective reaction member (15) for defining a check position. The plastics body (18) encapsulates an elongate tensile member (60) having a connection formation (50) at one end for attachment to a mount. The tensile member may be formed from a steel strip with a series of openings (62), so that the plastics material passes through the openings (62).

**ADVANTAGE** - Enables a tight fit to be achieved between the pin and aperture, and so reduces the likelihood of rattle.

**ABSTRACTED-PUB-NO: GB 2266338B**

**EQUIVALENT-ABSTRACTS:**

**A door check mechanism including a door check arm longitudinally movable through a check housing, the check arm having opposite cam faces and the check housing including a pair of reaction members biased toward one another, the check arm passing between the pair of reaction members so that a respective reaction member is in contact with a respective cam face of the check arm, the check arm having an elongate body moulded from a plastics material so as to define said opposite cam faces, at least one of said cam faces having moulded therein a laterally projecting shoulder for cooperation with a respective reaction member for defining a check position, the body encapsulating an elongate tensile member having a connection formation at one end for attachment to a mount, said connection formation comprising an aperture located at said one end to enable the arm to be pivotally connected to said mount, the aperture being formed by an annular flared wall portion of said tensile member.**

**CHOSEN-DRAWING: Dwg.1/3 Dwg.1**

**TITLE-TERMS: DOOR CHECK MECHANISM VEHICLE ARM MOVE THROUGH HOUSING OPPOSED CAM  
FACE PAIR REACT MEMBER BIAS ONE**

**DERWENT-CLASS: Q47**

**SECONDARY-ACC-NO:**

**Non-CPI Secondary Accession Numbers: N1993-255005**

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